

1 CLAIMS

2 *See* 1. A method comprising:

3 providing an extended configuration descriptor in firmware of a USB
4 device, the extended configuration descriptor comprising a set of non-standard
5 class codes ; and

6 responsive to receiving a host-specific device request, communicating the
7 extended configuration descriptor to a requestor.
8

9 2. A method as recited in claim 1, wherein the set of non-standard class
10 codes includes non-standard subclass codes.
11

12 3. A method as recited in claim 1, wherein a non-standard class code
13 comprises a class code or a subclass code that is not defined by the USB DWG.
14

15 4. A method as recited in claim 1, wherein the extended configuration
16 descriptor further comprises:

17 a control function section indicating information corresponding to a
18 function for the USB device.
19

20 5. A method as recited in claim 1, wherein the extended configuration
21 descriptor further comprises:

22 a header section indicating the number of control function sections for
23 which mappings exist in the extended configuration descriptor; and,

24 one or more control function sections, each control function section
25 indicating information corresponding to a single function for the USB device.

1
2 6. One or more computer-readable media containing a computer
3 executable program that performs a method as recited in claim 1.

4
5 7. A method comprising:
6 querying a USB device using a host-specific device request to obtain a
7 descriptor indicating a set of non-standard class codes;
8 determining one or more compatible device drivers based on the set of
9 codes indicated by the descriptor; and
10 loading the one or more compatible device drivers to control the USB
11 device.

12
13 8. A method as recited in claim 7, wherein the querying comprises:
14 communicating a standard USB request to the USB device; and
15 returning the extended configuration descriptor in response to the standard
16 USB request, the extended configuration descriptor corresponding in the USB
17 device to a host specific device request.

18
19 9. A method as recited in claim 7, wherein the set of non-standard class
20 codes includes non-standard subclass codes.

21
22 10. A method as recited in claim 7, wherein a non-standard class code
23 comprises a class code or a subclass code that is not defined by the USB DWG.
24
25

1 11. A method as recited in claim 7 wherein the extended configuration
2 descriptor comprises:

3 a control function section indicating information corresponding to a
4 function for the USB device.

5
6 12. A method as recited in claim 7, wherein the extended configuration
7 descriptor comprises:

8 a header section indicating the number of control function sections for
9 which mappings exist in the extended configuration descriptor; and,

10 one or more control function sections, each control function section
11 indicating information corresponding to a single function for the USB device.

12
13 13. One or more computer-readable media containing a computer
14 executable program that performs a method as recited in claim 7.

15
16 14. In a USB device that responds to device requests from a host, the
17 device requests including USB-specific device requests with corresponding USB-
18 specified request codes and device-specific device requests with corresponding
19 device-specified request codes, the USB-specific device requests including a
20 GET_DESCRIPTOR device request with a corresponding GET_DESCRIPTOR
21 request code, a method of implementing a host-specific device request to
22 determine one or more device drivers to control the USB device, the method
23 comprising:

24 receiving a GET_DESCRIPTOR device request that specifies a
25 predetermined index;

1 responding to the GET_DESCRIPTOR device request by returning an
2 extended configuration descriptor that corresponds in the USB device to the host-
3 specific device request for a device-specific request code, the extended
4 configuration descriptor specifying a non-standard class code that identifies a
5 device driver to control the USB device.

6
7
8 15. A method as recited in claim 14, wherein the extended configuration
9 descriptor comprises:

10 a control function section indicating information corresponding to a
11 function for the USB device.

12
13 16. A method as recited in claim 14, wherein the extended configuration
14 descriptor comprises device specific information, the device specific information
15 comprising:

16 a header section indicating the number of control functions for which
17 mappings exist in the extended configuration descriptor; and,

18 one or more control function sections, each control function section
19 indicating information corresponding to a single function for the USB device.

20
21 17. One or more computer-readable media containing a computer
22 executable program that performs a method as recited in claim 14.

1 **18.** A computer-readable medium containing computer-executable
2 instructions utilized by an application program to interact with a USB control
3 device, the computer-executable instructions comprising:

4 receiving a request from an application program for a set of non-standard
5 class codes and subclass codes that correspond to the USB control device;

6 querying the USB control device to obtain an extended configuration
7 descriptor, the extended configuration descriptor corresponding to a host-specific
8 device request that identifies the set of non-standard class codes and subclass
9 codes; and

10 returning the obtained extended configuration descriptor to the requesting
11 application program.

12
13 **19.** A computer-readable storage medium as recited in claim 18, further
14 comprising:

15 determining, by the requesting application program, one or more default
16 device drivers based on the returned extended configuration descriptor; and

17 loading the one or more default device drivers to control the control device.

18
19 **20.** A computer-readable storage medium as recited in claim 18,
20 wherein the obtained extended configuration descriptor comprises:

21 a control function section indicating information corresponding to a
22 function for the USB device.

1 21. A computer-readable storage medium as recited in claim 18,
2 wherein the obtained extended configuration descriptor comprises:

3 a header section indicating the number of control functions for which
4 mappings exist in the extended configuration descriptor; and,

5 one or more control function sections, each control function section
6 indicating information corresponding to a single function for the USB device.

7
8 22. A computer comprising one or more computer-readable media as
9 recited in claim 18.

10
11 23. One or more computer-readable media containing a computer-
12 executable program for use in conjunction with a USB device that responds to
13 device requests from the program, the device requests including USB-specific
14 device requests with corresponding USB-specified request codes and device-
15 specific device requests with corresponding device-specified request codes, , the
16 program comprising:

17 sending a request to the USB device for an extended configuration
18 descriptor indicating one or more control functions that correspond to the USB
19 device;

20 receiving the extended configuration descriptor from the USB device in
21 response to the request, wherein the extended configuration descriptor corresponds
22 in the USB device to a host-specific device request.

1 **24.** One or more computer-readable media as recited in claim 23,
2 wherein the extended configuration descriptor comprises:

3 a control function section indicating information corresponding to a
4 function for the USB device.

5
6 **25.** One or more computer-readable media as recited in claim 23,
7 wherein the extended configuration descriptor comprises:

8 a header section indicating the number of control functions for which
9 mappings exist in the extended configuration descriptor; and,

10 one or more control function sections, each control function section
11 indicating information corresponding to a single function for the USB device.

12
13 **26.** One or more computer-readable media as recited in claim 23,
14 wherein the program further comprises:

15 determining one or more compatible device drivers based on the received
16 extended configuration descriptor.

17
18 **27.** A computer comprising one or more computer-readable media as
19 recited in claim 23.

20
21 **28.** A USB device comprising:

22 a processor;

23 a port coupled to the processor;

24 a memory coupled to the processor;
25

1 an extended configuration descriptor stored in the memory, the extended
2 configuration descriptor comprising information that identifies a set of non-
3 standard compatible IDs corresponding to the USB device; and

4 a control program module stored in the memory, the control program
5 module being configured to send the extended configuration descriptor to a
6 requestor responsive to receiving a host-specific device request at the port.

7
8 **29.** A USB device as recited in claim 28, wherein the set non-standard
9 compatible IDs comprise class codes and/or subclass codes that are not defined by
10 the USB DWG.

11
12 **30.** A USB device as recited in claim 28, wherein the extended
13 configuration descriptor comprises:

14 a control function section indicating information corresponding to a
15 function for the USB device.

16
17 **31.** A USB device as recited in claim 28, wherein the extended
18 configuration descriptor comprises:

19 a header section indicating the number of control functions for which
20 mappings exist in the extended configuration descriptor; and,

21 one or more control function sections, each control function section
22 indicating information corresponding to a single function for the USB device.

1 32. A USB device as recited in claim 28, wherein the USB device
2 further comprises:

3 a plurality of logical devices, each logical device (LD) being a sub-device
4 of the USB device;

5 wherein the extended configuration descriptor further comprises a set of
6 information corresponding to a plurality of interfaces, each LD corresponding to
7 one or more of the interfaces; and

8 wherein the control program module is further configured to communicate
9 the set of information to a requestor responsive to receiving a single request at the
10 port.,

11
12 33. A USB device as recited in claim 28, wherein the set of non-
13 standard compatible IDs are not supported by the DWG.

14
15 34. A USB device as recited in claim 28, wherein the extended
16 configuration descriptor further comprises:

17 a control function section indicating information corresponding to a
18 function for the USB device.

19
20 35. A USB device recited in claim 28, wherein the extended
21 configuration descriptor further comprises:

22 a header section indicating the number of control functions for which
23 mappings exist in the extended configuration descriptor; and,

24 one or more control function sections, each control function section
25 indicating information corresponding to a single function for the USB device.

1
2 **36.** A computer-readable medium having stored thereon a data structure,
3 comprising:

4 a first data field comprising data indicating a count indicating the number
5 of USB control functions for which mappings exist in a descriptor; and

6 one or more second data fields, the number of second data fields based on
7 the count, each second data field comprising data corresponding to a single
8 function for a USB device.

9
10 **37.** A computer-readable medium as recited in claim 36, wherein the
11 first data field further comprises:

12 a total descriptor length indication; and

13 a descriptor version indication.

14
15 **38.** A computer-readable medium as recited in claim 36, wherein each
16 second data field further comprises a class code to override a standard USB DWG
17 standard class code.

18
19 **39.** A computer-readable medium as recited in claim 38, wherein the
20 class code is selected from a group of identifications comprising a compatible
21 class code and a sub-compatible class code.

1 40. A computer-readable medium as recited in claim 36, wherein each
2 second data field further comprises:
3 a control function length indication;
4 a total number of interfaces indication, the total number of interfaces being
5 grouped together to generate a control function; and
6 an interface number.